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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,559	11/25/2003	Jin Wang	I-2-0401.IUS	5822
24374 7590 01/10/2007 VOLPE AND KOENIG, P.C. DEPT. ICC UNITED PLAZA, SUITE 1600 30 SOUTH 17TH STREET PHILADELPHIA, PA 19103			EXAMINER WILLIAMS, LAWRENCE B	
			ART UNIT 2611	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		01/10/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

# Office Action Summary

Application No.

10/721,559

Applicant(s)

WANG, JIN

Examiner

Lawrence B. Williams

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☒ Claim(s) 1-6, 8, 14-15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities: Claim 1 recites the limitation "the unknown channel responses" in lines 7-8. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

3. Claim 2 is objected to because of the following informalities: Claim 2 uses "a)" which was used in claim 1, to denote an additional step. The examiner suggest applicant use a new letter for clarity.

Appropriate correction is required.

4. Claim 3 is objected to because of the following informalities: Claim 3 uses "a)" which was used in two preceding claims, to denote an additional step. The examiner suggest applicant use a new letter for clarity.

Appropriate correction is required.

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5. Claim 4 is objected to because of the following informalities: Claim 4 recites the limitation "the received symbols" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

6. Claim 5 is objected to because of the following informalities:

a.) The examiner suggests applicant replace "detector" with "detection" in line 1 of the claim for consistency with claim 1.

b.) The examiner suggests applicant replace "decoder" with "decoding" in line 2 of the claim for consistency with claim 1.

Appropriate correction is required.

7. Claim 6 is objected to because of the following informalities:

a.) Claim 6 recites the limitation "the turbo decoding function" in line 1. There is insufficient antecedent basis for this limitation in the claim.

b.) Claim 6 uses "a)" which has been used in previous claims. The examiner suggests applicant use new letters for clarity.

Appropriate correction is required.

8. Claim 8 is objected to because of the following informalities: Claim 8 recites the limitation "the unknown channel responses" in lines 7-8. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

9. Claim 14 is objected to because of the following informalities: The examiner suggests applicant replace “second subtracting means” with “first subtracting means”. The preceding claim 13 recites “first means for subtracting from the decoded quantity the deinterleaved quantity”. It is this means for subtracting according to page 5, paragraph [0028] whose outputs are used through the interleaver back to the detector and summed with the multi-user estimate to refine the multiuser estimate.

Appropriate correction is required.

10. Claim 15 is objected to because of the following informalities: The examiner suggests applicant replace the word “interleaving” with “interleaver” in line 14 of the claim.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

12. Claim 7 is rejected under 35 U.S.C. 112, second paragraph. Claim 7 recites the limitation “the method of claim 6 wherein the result from step (i) is employed to successively refine the multiuser estimate”. There is insufficient antecedent basis for this limitation in the claim.

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13. Claim 16 is rejected under 35 U.S.C. 112, second paragraph. Claim 16 recites the limitation "the unknown channel responses" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1-4, 6, 8-11, 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Yang et al. (Adaptive Bayesian Multi-user Detection for Synchronous CDMA with Gaussian and Impulsive Noise).

(1) With regard to claim 1, Yang et al. discloses a method employed by a multi-user receiver to adaptively detect multi-user symbols, said multi-user symbols being subject to impairments occurring in a radio channel which impairments comprise inter-cell interference (ICI), an effective white Gaussian noise, multiple access interference (MAI) and inter-symbol interference (ISI), comprising: a) employing a novel Markov Chain Monte Carlo (MCMC) procedure using a Gibbs sampler to adaptively detect the multi-user symbols responsive to the unknown channel responses (pg. 2013; abstract, Introduction).

(2) With regard to claim 2, Yang et al. also discloses the method of claim 1 further comprising: a) employing maximum a posteriori probability (MAP) estimations obtained by a turbo decoder (pg(s). 2015-2016, IV. Adaptive Bayesian Multiuser Detection in Gaussian Noise;

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pg(s). 2019-2020, VI, Iterative Joint Multiuser Detection and Decoding-Adaptive Multiuser Detection). Yang et al. discloses in Fig. 2, an iterative Turbo receiver structure comprising channel decoders, inherently turbo decoders.

(3) With regard to claim 3, Yang et al. also discloses the method of claim 2 further comprising: a) exchanging extrinsic information with the turbo decoder to successively refine the performance (pg. 2013, abstract, pg(s). 2019-2020, VI., Iterative Joint Multiuser Detection and Decoding-Adaptive Multiuser Detection).

(4) With regard to claim 4, Yang et al. also discloses the method of claim 1 wherein the received symbols are communicated in CDMA (pg. 2013, abstract).

(5) With regard to claim 6, Yang et al. also discloses in Fig. 2, wherein the method of claim 1 comprises deinterleaving a difference between a multi-user estimate and an interleaved quantity (1<sup>st</sup> summer); turbo decoding (Yang et al. discloses in Fig. 2, a turbo receiver structure consisting of soft-input soft output channel decoders, inherently turbo decoders for turbo decoding) the de-interleaved quantity; subtracting from the decoded quantity (2<sup>nd</sup> summer) the deinterleaved quantity; and subtracting (1<sup>st</sup> summer) the interleaved quantity from the multi-user estimate (pg. 2019-2020, VI., Iterative Joint Multiuser Detection and Decoding-Adaptive Multiuser Detection).

(6) With regard to claim 8, Yang et al. discloses in Fig. 2, an apparatus employed by a multi-user receiver to adaptively detect multi-user symbols, said multi-user symbols being subject to impairments occurring in a radio channel which impairments comprise inter-cell interference (ICI), an effective white Gaussian noise, multiple access interference (MAI) and inter-symbol interference (ISI), comprising: a) employing a novel Markov Chain Monte Carlo

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(MCMC) procedure using a Gibbs sampler to adaptively detect the multi-user symbols responsive to the unknown channel responses (pg. 2013, abstract).

(7) With regard to claim 9, Yang et al. also discloses the apparatus of claim 8 further comprising: a) a turbo decoder having means employing maximum a posteriori probability (MAP) estimations (pg(s). 2015-2016, IV. Adaptive Bayesian Multiuser Detection in Gaussian Noise; pg(s). 2019-2020, VI, Iterative Joint Multiuser Detection and Decoding-Adaptive Multiuser Detection). Yang et al. discloses in Fig. 2, an iterative Turbo receiver structure comprising channel decoders, inherently turbo decoders. Yang et al. teaches calculations of maximum a posterior (MAP) estimates in the section titled Adaptive Bayesian Multiuser Detection in Gaussian Noise. Means for doing so are inherent.

(8) With regard to claim 10, Yang et al. also discloses the exchanging of extrinsic information with the turbo decoder to successively refine the performance (pg. 2019-2020, VI. Iterative Joint Multiuser Detection and Decoding-Adaptive Multiuser Detection). Means for exchanging would be inherent.

(9) With regard to claim 11, Yang et al. also discloses in Fig. 2, the apparatus of claim 8 further comprising means (adaptive Bayesian multi-user detector) for receiving said symbols in CDMA (pg. 2013, Introduction).

(10) With regard to claim 13, Yang et al. also discloses in Fig. 2, the apparatus of claim 8, wherein turbo decoder comprises means for deinterleaving (deinterleaver) a difference (1<sup>st</sup> summer) between a multi-user estimate and an interleaved quantity; means for turbo decoding (Yang discloses a turbo receiver structure consisting of soft-input soft output channel decoders, inherently turbo decoders for turbo decoding) the de-interleaved quantity; first means for



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subtracting ( $2^{\text{nd}}$  summer following the decoder) from the decoded quantity the deinterleaved quantity; and second means ( $1^{\text{st}}$  summer following the detector) for subtracting the interleaved quantity from the multi-user estimate (pg. 2019-2020, VI. Iterative Joint Multiuser Detection and Decoding-Adaptive Turbo Multiuser Detection).

(11) With regard to claim 14, Yang et al. discloses employing an output of the first subtracting means (subtractor coupled between decoder and interleaver) to refine the multiuser estimate. Yang et al. discloses extrinsic information delivered by decoders is interleaved and fed back to the adaptive Bayesian multiuser detector as a prior information for the next iteration (pg. 2019-2020, VI. Iterative Joint Multiuser Detection and Decoding-Adaptive Turbo Multiuser Detection).

(12) With regard to claim 15, Yang et al. also discloses in Fig. 2, apparatus for adaptively detecting multi-user symbols, comprising: an adaptive Bayesian multi-user detector (shown), an interleaver; a deinterleaver; a turbo decoder (Yang discloses a turbo receiver structure consisting of soft-input soft output channel decoders, inherently turbo decoders for turbo decoding in the turbo receiver); a first summing circuit ( $1^{\text{st}}$  summer following the detector) for subtracting an output of the interleaver from an output of the detector; said deinterleaver having an input receiving an output of the first summing circuit and output coupled to an input of said turbo decoder; a second summing circuit ( $2^{\text{nd}}$  summer following decoder) for subtracting an output of said deinterleaver from said turbo decoder; said interleaver having an input receiving an output of said second summing circuit; and the output of said interleaver being further coupled to an input of said detector for refining the output of said detector (pg. 2019-2020, VI. Iterative Joint Multiuser Detection and Decoding-Adaptive Turbo Multiuser Detection).

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(13) With regard to claim 16, Yang et al. also discloses the apparatus of claim 15 wherein said turbo decoder comprises: means employing a novel Markov Chain Monte Carlo (MCMC) procedure using a Gibbs Sampler to adaptively detect the multi-user symbols responsive to the unknown channel responses (pg. 2013, abstract). Yang et al. discloses Gibbs sampler and a Markov Chain Monte Carlo (MCMC) procedure used for Bayesian computation. The means would be an inherent feature.

***Claim Rejections - 35 USC § 103***

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al.

(Adaptive Bayesian Multi-user Detection for Synchronous CDMA with Gaussian and Impulsive Noise) as applied to claim 1, above.

Yang et al. discloses the method using the adaptive Bayesian multiuser detector and turbo decoder derived for synchronous CDMA channels (abstract). The HSDPA is a system based on CDMA as is TDD, ie., CDMA/TDD. Thus the disclosure of Yang et al. method would encompass the HSDPA in a time division duplex system.

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18. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. (Adaptive Bayesian Multi-user Detection for Synchronous CDMA with Gaussian and Impulsive Noise) as applied to claim 8, above.

Yang et al. discloses the adaptive Bayesian multiuser detector and turbo decoder apparatus derived for synchronous CDMA channels (pg. 2013, abstract). The HSDPA is a system based on CDMA as is TDD, ie., CDMA/TDD. Thus the disclosure of apparatus of Yang et al. disclosed in Fig. 2, would encompass the HSDPA in a time division duplex system.

### ***Conclusion***

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Moghari et al. discloses in IEEE Wireless Communications and Networking Conference, Group-Blind Turbo Multiuser for CDMA Using a Gaussian Approximation.

b.) Nagaraj et al. discloses in IEEE 60th Vehicular Technology Conference, A Novel Bayesian Detection Approach for ACK/NACK Signaling in Third Generation High Speed Packet Data System.

c.) Gollamudi et al. discloses in US 2005/0265250 A1 Methods of Wireless Communication.

d.) Iltis et al. discloses Apparatus And Methods For Utilizing A Blind Equalizer Based On A Bayesian Symbol Sequence Estimator For Use In Digital Communication.

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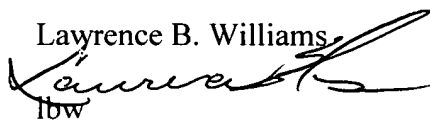
20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037.

The examiner can normally be reached on Monday-Friday (8:00-6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ghayour Mohammad can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams

A handwritten signature in black ink, appearing to read 'Lawrence B. Williams', with a stylized flourish at the end.

lbw

January 6, 2007